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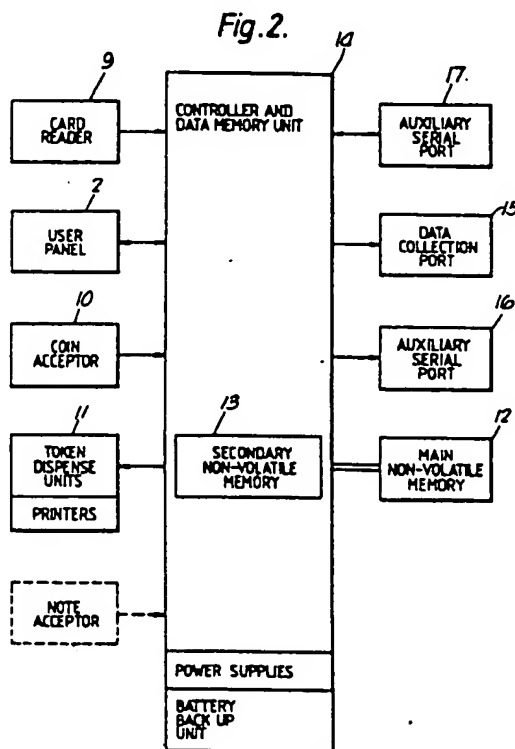
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## (54) Sheet dispenser

(57) A sheet dispenser for dispensing sheets carrying information to enable a commodity to be dispensed is described. The dispenser comprises a coin acceptor 10 for receiving a quantity of coins from an operator and for generating a signal representing the quantity of money deposited. A control system 11, 14 is provided which is responsive to information on an identification card and to the signal from the coin acceptor 10 to cause one or more tokens to be dispensed, each token carrying information relating to the quantity of money received. Two stores 12, 13 are provided for recording the same transaction information, the stores being separately accessible by a microprocessor whereby the stored information may be read by the microprocessor.



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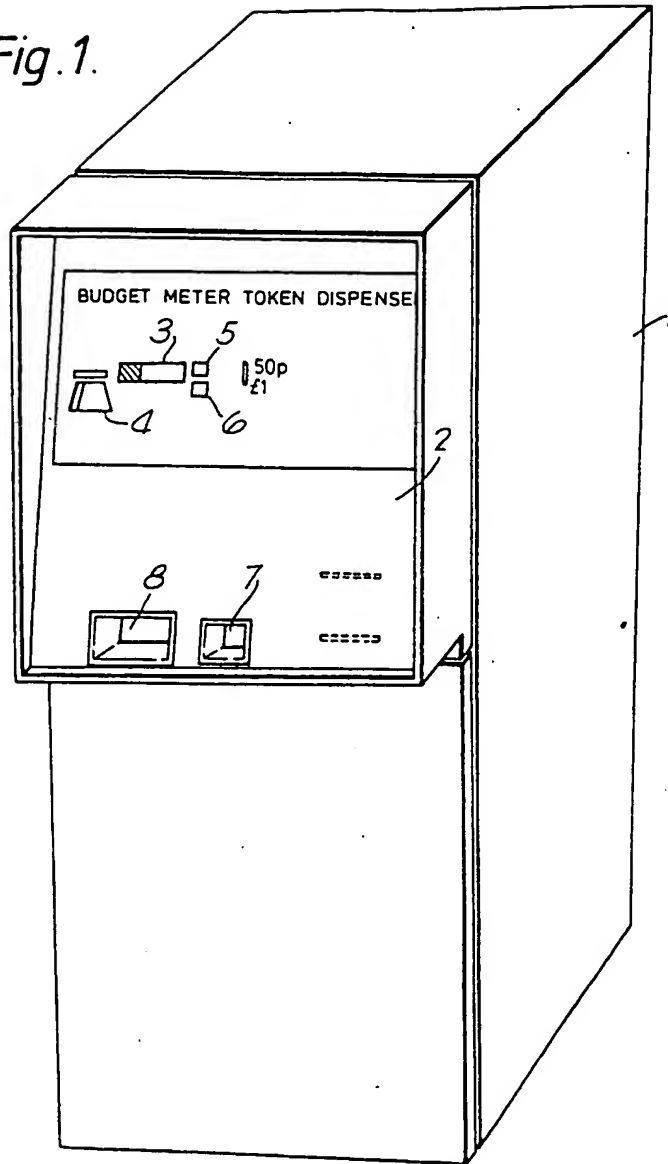
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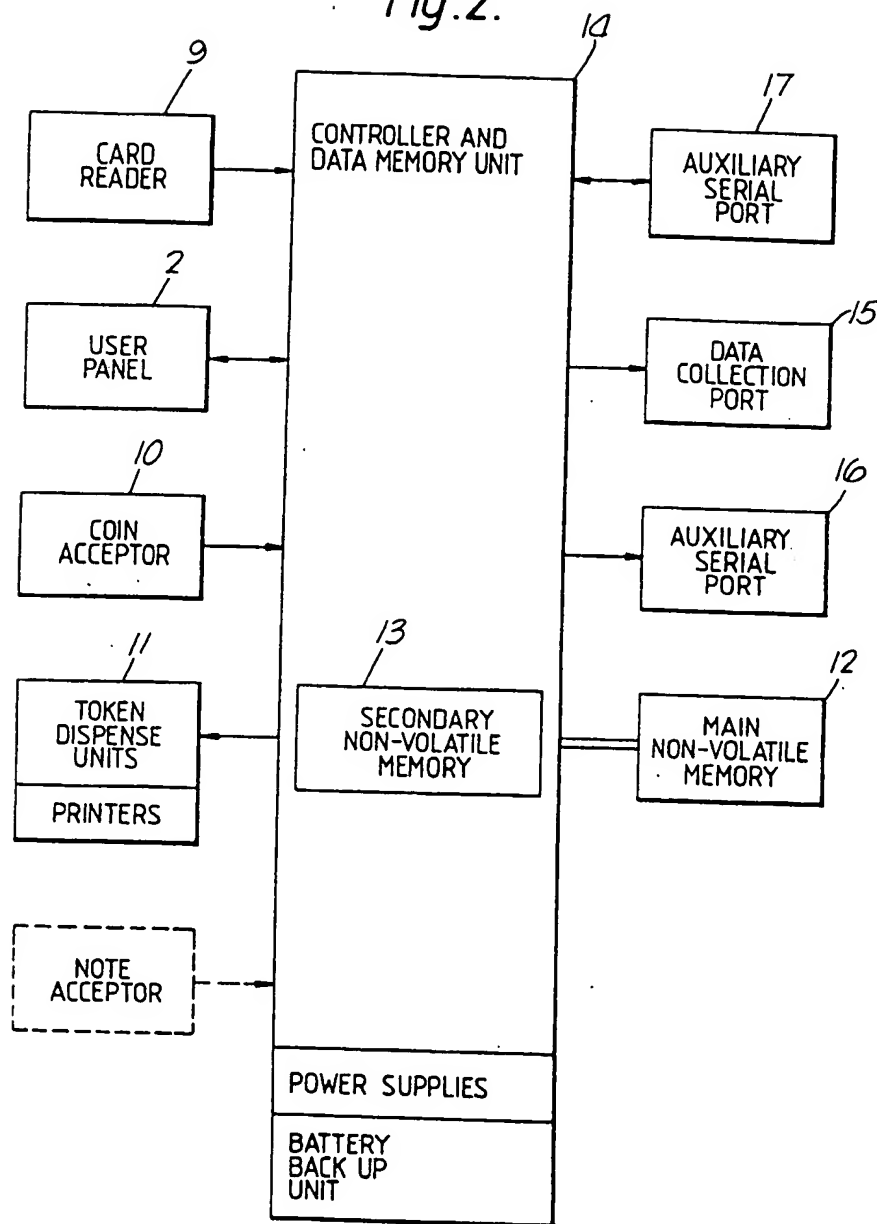
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Fig. 1.



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Fig. 2.



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Fig. 3a.

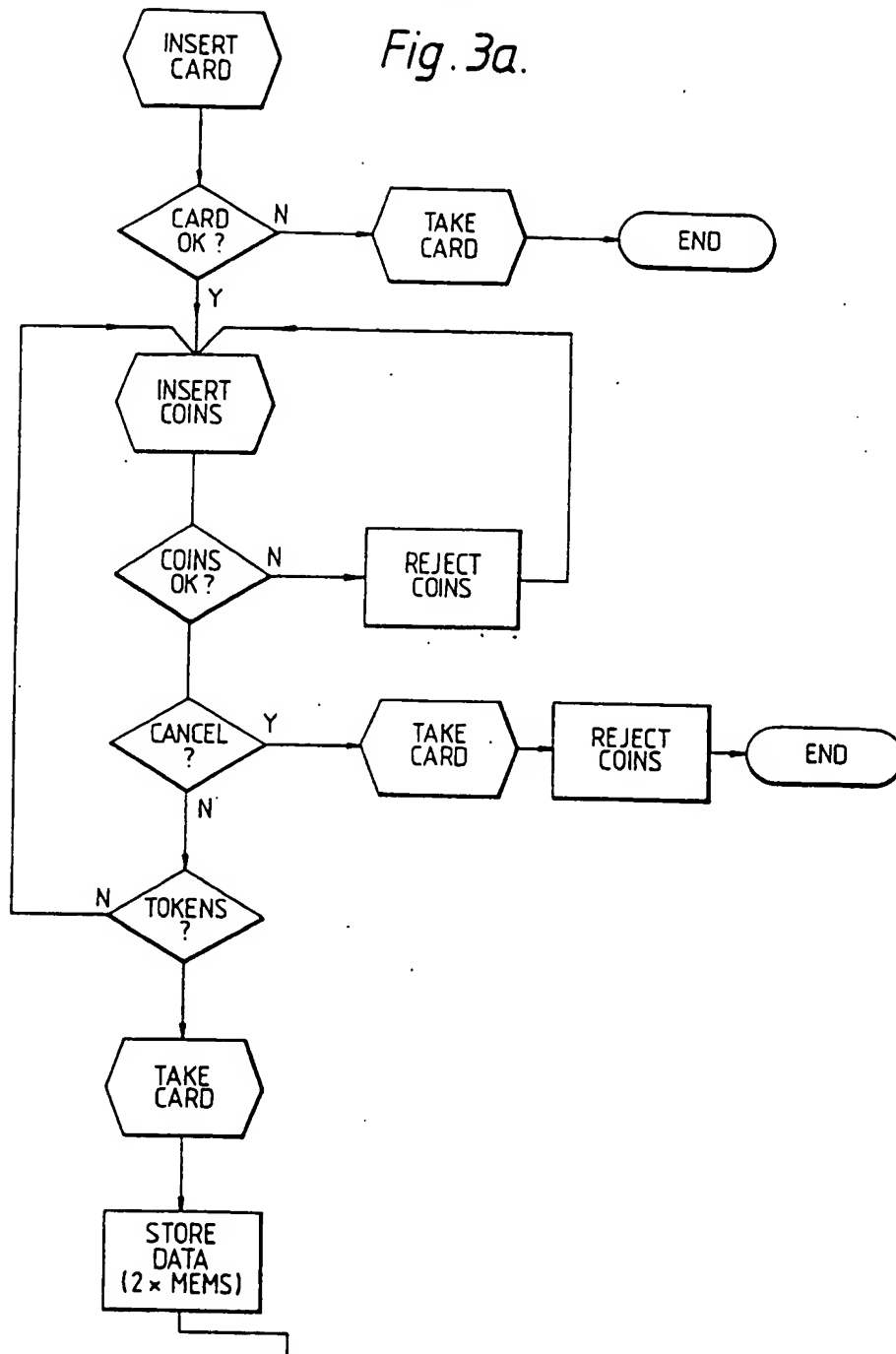
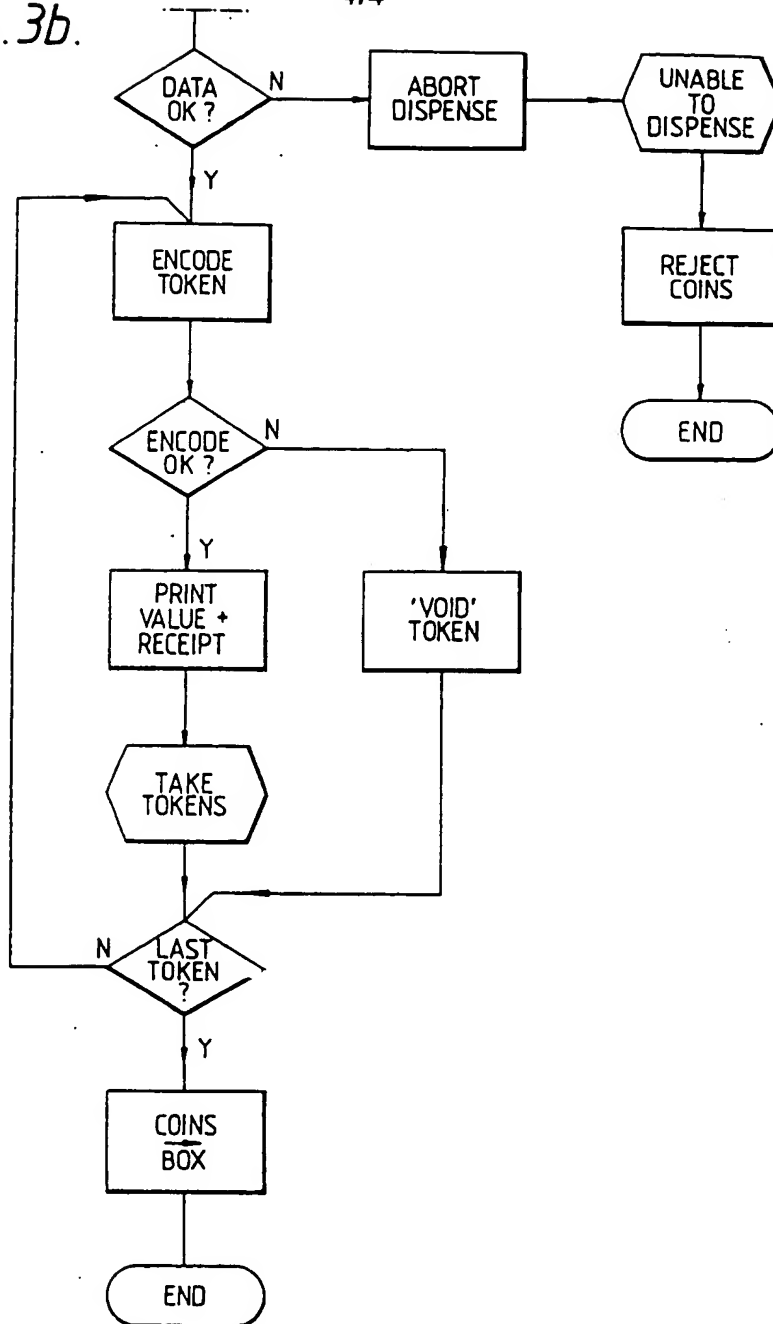


Fig. 3b.



## SPECIFICATION

## Sheet dispenser

- 5 The invention relates to a sheet dispenser for dispensing sheets carrying information to enable a commodity to be dispensed.

One method for purchasing commodities such as electricity and gas is to provide a meter at the consumer's location in which the consumer inserts money in the form of coins or the like as a prepayment for the commodity. Various problems arise with this type of system since there is no record of the amount of money inserted except the content of the meter itself and there is the danger of the meters being tampered with to extract the money illegally.

In accordance with the present invention, a sheet dispenser for dispensing sheets carrying information to enable a commodity to be dispensed comprises a money receiver for receiving a quantity of money from an operator and for generating a signal representing the quantity of money received; a control system responsive to operator instructions and the signal from the money receiver to cause one or more sheets to be dispensed, each sheet carrying information relating to the quantity of money received; and two stores for storing the same transaction information, the stores being separably accessible by processing means whereby the stored information may be read by the processing means.

The invention deals with the problems mentioned above by providing a sheet dispenser which may be sited at a central location such as a property owned by the commodity supplier from which an operator may obtain sheets to various values for subsequent use in dispensing the commodity. Conveniently, where the commodity is metered commodity such as electricity or gas, the sheets are in the form of tokens which can be inserted into a meter in the form of a prepayment.

The use of two stores in the sheet dispenser is important in order to provide security against the information in one of the stores being corrupted. The information from the stores can be used to credit the operator's account and clearly it is essential that this information is correct.

Preferably, a first one of the stores is primarily accessible by the processing means and the second one of the stores is larger than the first whereby the second store is adapted to store the information in the first store and at least some of the information most recently deleted from the first store. In this way, additional security is achieved. Typically, the information will normally be read from the first store but if it should appear that this is incorrect, after that information has been cancelled from the first store, the second store can be accessed since that information

will still be present in that store.

Preferably, the sheets carry magnetic recording means, such as magnetic stripes, the control system including a magnetic recorder for recording on the magnetic recording means transaction information such as the value of the commodity which has been bought. This is advantageous since the dispensing meter can include a simple magnetic reading head to determine the value of the token.

An alternative arrangement would be to record the value information in visible form but this would require more complex optical systems for reading the information. Conveniently, however, the control system also includes a printer for printing on the sheet transaction information such as the value of the commodity purchased the operator's identity and the like.

The stores should preferably be non-volatile, conveniently random access memories.

The transaction information preferably comprises at least a representation of the operator's identity and the amount of money represented by the dispensed token(s).

The control system preferably includes a magnetic stripe reader for reading information off a magnetic stripe on an identification card. Alternatively, the system could include a keypad or the like for inputting information.

Typically, the money receiver will comprise a coin acceptor which may be of any conventional type.

In order that the invention may be better understood, a preferred embodiment will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of the dispenser;

Figure 2 is a block diagram of the components of the dispenser; and

Figure 3 is a simplified flow diagram illustrating operation of the dispenser.

The dispenser comprises a housing 1 with a front panel 2 including an identification (ID) card slot 3, a coin receiving slot 4, and keys 5, 6. A coin reject slot 7 is provided in a lower portion of the panel 2 together with a token dispense slot 8.

The components making up the token dispenser are illustrated in block diagram form in Figure 2. These include an ID card reader 9 associated with the slot 3, a coin acceptor 10 associated with the slots 4, 7, and token dispense units 11. The token dispense units include respective stores for storing rolls of unused tokens of different types which may be preprinted with "standard" information relating to the supplier of the commodity and the like, and printers for printing additional information on the token in accordance with the value of the commodity represented by the token. As indicated by dashed lines, the dispenser could be adapted to accept bank notes as well as coins.

The dispenser also includes a main non-volatile memory of for example the EEPROM type 12 and a secondary non-volatile memory of the EEPROM type 13 both linked with the token dispense units 11. Overall control is provided by a controller 14 linked to all the components described.

Operation of the dispenser will now be described with reference to the flow diagram shown in Figure 3. Each consumer is provided with his own ID card which includes a magnetic stripe into which is encoded his consumer number and the token type. The consumer number will be a unique number associated with that consumer while the token type relates to the use to which the token is put since, in the case of prepayment meters, there may be more than one meter type with each meter type requiring a different form of token.

The card reader 9 then reads the information on the ID card and if the card is not satisfactory, for example the card relates to a different commodity supplier, the card is returned through the slot 3 to the operator. If, however, the card is accepted, the operator then inserts into the slot 4 the required number of coins for the value of the token which he wishes to receive. The coins are examined by the coin acceptor 10 and if they are not accepted, the coins will be returned in a reject slot 7. If the coins are accepted, the operator is given the option of cancelling the transaction and if he accepts that option by pressing one of the keys 5, 6, the coins will be rejected and his ID card will be returned through the slot 3. If the operator instructs the transaction to proceed by pressing the other of the keys 5, 6, ("Tokens") his ID card will be returned after the information stored in the magnetic stripe on the card has been stored in each of the two memories 12, 13. The value of the token or tokens to be dispensed will also be stored in each of the memories 12, 13.

The controller 14 then checks that the stored data is correct by comparing the stored data with the information read by the card reader 9 and determined by the coin acceptor 10. If the information is not the same the transaction will be aborted and the ID card returned to the user. In addition the coins will be rejected.

If the information stored is verified, one of the token dispense units 11 will be activated in accordance with the meter type read from the ID card and the leading token(s), in a roll will be encoded by the unit. If a fault arises during this encode operation, the token or tokens will be overprinted with the word "Void". If the encode operation is successful, the value encoded will also be printed on the token(s) which acts as a receipt and the token or tokens are then dispensed through the outlet 8. The coins then pass from an Escrow position into a secure coin box.

The controller 14 additionally checks that there are still spare tokens in each roll and, if a roll has run out, the dispenser will display a suitable indication.

The information in the main memory 12 can be downloaded via the controller 14 by connecting a remote computer with a data collection port 15 of the controller 14. Alternatively, the main memory 12 may be demountable and after a suitable period such as one or two days, the memory 12 will be demounted from the dispenser and coupled with the remote computer to enable the data stored to be downloaded and deleted from the memory. This data can then be used to credit the consumer's account, print a list of transactions and the like.

If it is found that the data read from the main memory 12 has been corrupted, a back-up is provided by the second memory 13 which has a larger memory size than the main memory 12 so that it holds not only the most recent information as stored in the main memory 12, but also information which has been recently deleted from the main memory. For example, if the main memory is capable of storing up to two days transactions the secondary memory 13 may be capable of storing up to 4 days worth of transactions. To obtain the information from the secondary memory 13, the remote computer is again connected to the data collection port 15 but addresses the second memory 13. In this way, a considerable increase in security of the recorded information is achieved.

In some cases, it may be desirable to provide a logging printer (not shown) connected to an auxiliary serial port 16 to provide a hard copy receipt for each token which is issued.

This receipt will carry various transaction data including the consumer number, transaction value and the like and provides an alternative to using the token itself as a receipt.

Further an auxiliary serial port 17 may be provided to enable an engineer to interrogate the controller 14 to enable on-line fault diagnosis to be achieved.

The controller 14 will be powered in a conventional manner and be provided with a battery back-up unit.

Connection with the remote computer may be achieved by any conventional connection system such as the public switched telephone network, leased lines, or packet switch stream networks.

Typically the dispenser will be one of several at different locations serviced by a common central computer. The computer may be connected to each dispenser or the main memories of each dispenser may be taken to the central computer for reading.

#### CLAIMS

1. A sheet dispenser for dispensing sheets carrying information to enable a commodity to

- be dispensed, the dispenser comprising a money receiver for receiving a quantity of money from an operator and for generating a signal representing the quantity of money received; a control system responsive to operator instructions and the signal from the money receiver to cause one or more sheets to be dispensed, each sheet carrying information relating to the quantity of money received; and two stores for recording the same transaction information, the stores being separably accessible by processing means whereby the stored information may be read by the processing means.
2. A dispenser according to claim 1, wherein a first one of the stores is primarily accessible by the processing means and the second one of the stores is larger than the first whereby the second store is adapted to store the information in the first store and at least some of the information most recently deleted from the first store.
3. A dispenser according to claim 2, wherein the first store is demountable.
4. A dispenser according to any of claims 1 to 3, wherein the control system comprises magnetic recording means for recording, on a magnetic stripe of a sheet, information relating to the value of the sheet.
5. A sheet dispenser substantially as herein before described with reference to the accompanying drawings.
6. A system for dispensing sheets carrying information to enable a commodity to be dispensed, the system comprising a number of sheet dispensers according to any of the preceding claims; and a common monitoring system including a computer for reading information in the stores of each dispenser and for recording the information in a central store.

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